

IN THE CLAIMS:

On page 18, line 1, cancel "CLAIMS" and substitute –WE CLAIM AS OUR INVENTION:--

Cancel claims 1-54.

1-54. (Cancelled)

Add the following new claims:

55. (New) A spectroscopic imaging method using an SSFP-RF excitation pulse sequence, comprising the steps of:

with a repetition time TR, irradiating RF excitation pulses, each having a flip angle, into a subject;

between said RF excitation pulses, in a first read-out window without a magnetic field gradient, reading out an FID-like SSFP signal S1, and in a second readout window separate from said first readout window and without a magnetic gradient field, reading out an echo-like SSFP signal S2;

before said readout window, activating at least one phase coding gradient that phase codes said subject in at least one spatial direction; and

before a next RF excitation pulse, activating at least one further phase coding gradient that cancels said phase coding gradient in said at least one spatial direction.

56. (New) A method as claimed in claim 55 comprising separating said first and second readout windows by activating a spoiler gradient between said signals S1 and S2.

57. (New) A method as claimed in claim 55 comprising slice-selectively irradiating said subject with said RF excitation pulses.

58. (New) A method as claimed in claim 57 comprising separating said first and second readout windows by activating first and second spoiler gradients between said signals S1 and S2, and irradiating said subject with a

frequency-selective RF saturation pulse between said first and second spoiler gradients.

59. (New) A method as claimed in claim 55 comprising activating said at least one further phase coding gradient after said first readout window and before said second readout window, and activating another phase coding gradient, between said at least one further phase coding gradient and said second readout window, for phase coding said subject in at least one spatial direction.

60. (New) A method as claimed in claim 55 comprising frequency-selectively irradiating said RF excitation pulses.

61. (New) A method as claimed in claim 55 comprising before said second readout window, activating exactly two phase coding gradients to phase code said subject respectively in two spatial directions, and before said next RF excitation pulse, activating exactly two further phase coding gradients to respectively cancel said phase coding in said two spatial directions.

62. (New) A method as claimed in claim 55 comprising before said second readout window, activating exactly two phase coding gradients to phase code said subject respectively in three spatial directions, and before said next RF excitation pulse, activating exactly three further phase coding gradients to respectively cancel said phase coding in said three spatial directions.

63. (New) A method as claimed in claim 55 comprising activating said at least one further phase coding gradient after said first readout window and before said second readout window, and activating another phase coding gradient, between said at least one further phase coding gradient and said second readout window, for phase coding said subject in at least one spatial direction, comprising before said second readout window, activating exactly two phase coding gradients to phase code said subject respectively in two spatial directions, and before said next RF excitation pulse, activating exactly

two further phase coding gradients to respectively cancel said phase coding in said two spatial directions.

64. (New) A method as claimed in claim 55 comprising activating said at least one further phase coding gradient after said first readout window and before said second readout window, and activating another phase coding gradient, between said at least one further phase coding gradient and said second readout window, for phase coding said subject in at least one spatial direction, comprising before said second readout window, activating exactly three phase coding gradients to phase code said subject respectively in three spatial directions, and before said next RF excitation pulse, activating exactly three further phase coding gradients to respectively cancel said phase coding in said three spatial directions.

65. (New) A method as claimed in claim 55 comprising detecting said signals S1 and S2 with a single RF coil.

66. (New) A method as claimed in claim 55 comprising detecting said signal S1 with a first RF coil having a first spatial sensitivity profile, and detecting said signal S2 with a second RF coil having a second spatial sensitivity profile, different from said first spatial sensitivity profile.

67. (New) A spectroscopic imaging method using an SSFP-RF excitation pulse sequence, comprising the steps of:

with a repetition time TR, irradiating a subject with RF excitation pulses, each having a flip angle;

between said RF excitation pulses, in a single readout window without a magnetic field gradient, reading out a single FID-like SSFP signal;

before said readout window, activating at least one phase coding gradient to phase code said subject in at least one spatial direction; and

before a next RF excitation pulse, activating at least one further phase code gradient to cancel said phase coding in said at least one spatial direction.

68. (New) A method as claimed in claim 67 comprising after said readout window, activating a spoiler gradient.

69. (New) A method as claimed in claim 67 comprising slice/selectively irradiating said subject with said RF excitation pulses.

70. (New) A method as claimed in claim 69 comprising after said readout window, activating first and second spoiler gradients, and between said first and second spoiler gradients, irradiating said subject with a frequency selective RF saturation pulse.

71. (New) A method as claimed in claim 67 comprising frequency-selectively irradiating said subject with said RF excitation pulses.

72. (New) A method as claimed in claim 67 comprising before said readout window, activating a spoiler gradient.

73. (New) A method as claimed in claim 67 comprising, before said readout window, activating first and second spoiler gradients, and between said first and second spoiler gradients, irradiating said subject with a frequency-selective RF saturation pulse.

74. (New) A method as claimed in claim 67 comprising before said second readout window, activating exactly two phase coding gradients to phase code said subject respectively in two spatial directions, and before said next RF excitation pulse, activating exactly two further phase coding gradients to respectively cancel said phase coding in said two spatial directions.

75. (New) A method as claimed in claim 67 comprising before said second readout window, activating exactly two phase coding gradients to phase code said subject respectively in three spatial directions, and before said next RF excitation pulse, activating exactly three further phase coding

gradients to respectively cancel said phase coding in said three spatial directions.

76. (New) A method as claimed in claim 67 comprising detecting said signals S1 and S2 with a single RF coil.

77. (New) A method as claimed in claim 67 comprising detecting said signal S1 with a first RF coil having a first spatial sensitivity profile, and detecting said signal S2 with a second RF coil having a second spatial sensitivity profile, different from said first spatial sensitivity profile.

78. (New) A spectroscopic imaging method using an SSFP-RF excitation pulse sequence, comprising the steps of:

with a repetition time TR, irradiating a subject with RF excitation pulses, each having a flip angle;

before said RF excitation pulses, and in a single readout window without a magnetic field gradient, reading out a single echo-like SSFP signal;

before said readout window, activating at least one phase coding gradient to phase code said subject in at least one spatial direction; and

before a next RF excitation pulse, activating at least one further phase coding gradient to cancel said phase coding in said at least one spatial direction.

79. (New) A method as claimed in claim 78 comprising before said second readout window, activating exactly two phase coding gradients to phase code said subject respectively in two spatial directions, and before said next RF excitation pulse, activating exactly two further phase coding gradients to respectively cancel said phase coding in said two spatial directions.

80. (New) A method as claimed in claim 78 comprising before said second readout window, activating exactly two phase coding gradients to phase code said subject respectively in three spatial directions, and before

said next RF excitation pulse, activating exactly three further phase coding gradients to respectively cancel said phase coding in said three spatial directions.

81. (New) A method as claimed in claim 78 comprising detecting said signals S1 and S2 with a single RF coil.

82. (New) A method as claimed in claim 78 comprising detecting said signal S1 with a first RF coil having a first spatial sensitivity profile, and detecting said signal S2 with a second RF coil having a second spatial sensitivity profile, different from said first spatial sensitivity profile.

83. (New) A spectroscopic imaging method using an SSFP-RF excitation pulse sequence, comprising the steps of:

with a repetition time, irradiating a subject with RF excitation pulses, each having a flip angle;

between said RF excitation pulses, in a first readout window occurring simultaneously with at least one readout gradient alternating in a spatial direction, reading out an FID-like SSFP signal S1 and, in a second readout window separate from said first readout window, occurring simultaneously with at least one further readout gradient alternating in a spatial direction, reading out an echo-like SSFP signal S2.

84. (New) A method as claimed in claim 83 comprising activating a single readout gradient alternating in a spatial direction in both of said first and second window and, before said readout window, activating at least one phase coding gradient to phase code said subject in at least one spatial direction, and before next RF excitation pulse, activating at least one further phase coding gradient to cancel said phase coding in said at least one spatial direction.

85. (New) A method as claimed in claim 83 comprising activating a first readout gradient alternating in a first spatial direction in said first window

and reading out said signal S1 under said first readout gradient, and activating a second readout gradient during said second window, alternating in a second spatial direction, different from said first spatial direction, and reading out said signal S2 under said second readout gradient, and before said first readout window activating a single phase coding gradient to phase code said subject in a spatial direction, and before a next RF excitation pulse, activating a single further phase coding gradient to cancel said phase coding in said spatial direction.

86. (New) A method as claimed in claim 83 comprising, in each of said first and second windows, activating exactly three readout gradients, respectively alternating in three different spatial directions, and reading out each of said signal S1 and said signal S2 under said three readout gradients.

87. (New) A method as claimed in claim 83 comprising separating said first and second readout windows by activating a spoiler gradient between said signals S1 and S2.

88. (New) A method as claimed in claim 83 comprising slice/selectively irradiating said subject with said RF excitation pulses.

89. (New) A method as claimed in claim 88 comprising activating first and second spoiler gradients between said signals S1 and S2, and irradiating said subject with a frequency-selected RF saturation pulse between said first and second spoiler gradients.

90. (New) A method as claimed in claim 88 comprising, before said first readout window, activating a phase coding gradient to phase code said subject in a spatial direction, and after said first readout window and before said second readout window, activating a further phase coding gradient to cancel said phase coding in said spatial direction, and activating another phase coding gradient to phase code said subject in a spatial direction.

91. (New) A method as claimed in claim 83 comprising frequency-selectively irradiating said subject with said RF excitation pulses.

92. (New) A method as claimed in claim 83 comprising detecting said signals S1 and S2 with a single RF coil.

93. (New) A method as claimed in claim 83 comprising detecting said signal S1 with a first RF coil having a first spatial sensitivity profile, and detecting said signal S2 with a second RF coil having a second spatial sensitivity profile, different from said first spatial sensitivity profile.

94. (New) A spectroscopic imaging method using an SSFP-RF excitation pulse sequence, comprising the steps of:

with a repetition time TR, irradiating a subject with RF excitation pulses, each having a flip angle; and

between said RF excitation pulses, activating at least one readout gradient in a single readout window, said at least one readout gradient oscillating in a spatial direction, and reading out a single FID-like SSFP signal.

95. (New) A method as claimed in claim 94 comprising activating a single readout gradient oscillating in a spatial direction and reading out said FID-like SSFP signal under said single readout gradient, and before said readout window activating at least one phase coding gradient to phase code said subject in at least one spatial direction, and before a next RF excitation pulse, activating at least one further phase coding gradient to cancel said phase coding gradient in said at least one spatial direction.

96. (New) A method as claimed in claim 94 comprising activating, in said readout window, only a first readout gradient alternating in a first spatial direction and a second readout gradient alternating in a second spatial direction, differing from said first spatial direction, and reading out said FID-like SSFP signal under both of said first and second readout gradients, and before said readout window activating a single phase coding gradient to phase code said subject in one spatial direction, and before a next RF

excitation pulse, activating a single further phase coding gradient to cancel said phase coding in said one spatial direction.

97. (New) A method as claimed in claim 94 comprising, in said readout window, activating exactly three readout gradients respectively alternating in three different spatial directions, and reading out said FID-like SSFP signal under all of said three readout gradients.

98. (New) A method as claimed in claim 94 comprising activating a spoiler gradient after said readout window.

99. (New) An imaging method as claimed in claim 94 comprising slice/selectively irradiating said subject with said RF excitation pulses.

100. (New) A method as claimed in claim 99 comprising activating first and second spoiler gradients after said readout window and, between said first and second spoiler gradients, irradiating said subject with a frequency-selective RF saturation pulse.

101. (New) A method as claimed in claim 94 comprising frequency-selectively irradiating said subject with said RF excitation pulses.

102. (New) A method as claimed in claim 94 comprising detecting said signals S1 and S2 with a single RF coil.

103. (New) A method as claimed in claim 94 comprising detecting said signal S1 with a first RF coil having a first spatial sensitivity profile, and detecting said signal S2 with a second RF coil having a second spatial sensitivity profile, different from said first spatial sensitivity profile.

104. (New) A spectroscopic imaging method using an SSFP-RF excitation pulse sequence, comprising the steps of:

with a repetition time TR, irradiating a subject with RF excitation pulses, each having a flip angle; and

between said RF excitation pulses, activating at least one readout gradient in a single readout window, said at least one readout gradient

oscillating in a spatial direction, and reading out a single echo-like SSFP signal.

105. (New) A method as claimed in claim 94 comprising activating a single readout gradient oscillating in a spatial direction and reading out said echo-like SSFP signal under said single readout gradient, and before said readout window activating at least one phase coding gradient to phase code said subject in at least one spatial direction, and before a next RF excitation pulse, activating at least one further phase coding gradient to cancel said phase coding gradient in said at least one spatial direction.

106. (New) A method as claimed in claim 94 comprising activating, in said readout window, only a first readout gradient alternating in a first spatial direction and a second readout gradient alternating in a second spatial direction, differing from said first spatial direction, and reading out said echo-like SSFP signal under both of said first and second readout gradients, and before said readout window activating a single phase coding gradient to phase code said subject in one spatial direction, and before a next RF excitation pulse, activating a single further phase coding gradient to cancel said phase coding in said one spatial direction.

107. (New) A method as claimed in claim 94 comprising, in said readout window, activating exactly three readout gradients respectively alternating in three different spatial directions, and reading out said echo-like SSFP signal under all of said three readout gradients.

108. (New) A method as claimed in claim 104 comprising activating a spoiler gradient after said readout window.

109. (New) An imaging method as claimed in claim 104 comprising slice/selectively irradiating said subject with said RF excitation pulses.

110. (New) A method as claimed in claim 94 comprising activating first and second spoiler gradients after said readout window and, between

said first and second spoiler gradients, irradiating said subject with a frequency-selective RF saturation pulse.

111. (New) A method as claimed in claim 104 comprising frequency-selectively irradiating said subject with said RF excitation pulses.

112. (New) A method as claimed in claim 104 comprising detecting said signals S1 and S2 with a single RF coil.

113. (New) A method as claimed in claim 104 comprising detecting said signal S1 with a first RF coil having a first spatial sensitivity profile, and detecting said signal S2 with a second RF coil having a second spatial sensitivity profile, different from said first spatial sensitivity profile.

114. (New) A magnetic resonance spectroscopy apparatus comprising:

- a radio frequency resonator arrangement and a gradient coil system;
and

- a control unit for operating said magnetic resonance scanner to, with a repetition time, irradiate the subject with RF excitation pulses emitted from said RF resonator arrangement, each of said RF excitation pulses having a flip angle, and, between said RF excitation pulses, in a first readout window without a magnetic field gradient, readout an FID-like SSFP signal S1 and, in a second readout window separate from said first readout window and without a magnetic field gradient, to readout an echo-like SSFP signal S2, and to activate, before said first readout window, at least one phase coding gradient emitted by said gradient coil system to phase code the subject in at least one spatial direction, and to activate at least one further phase coding gradient emitted by said gradient coil system to cancel said phase coding in said at least one spatial direction.

115. (New) A magnetic resonance spectroscopy apparatus comprising:

a radio frequency resonator arrangement and a gradient coil system;

a control unit for operating said magnetic resonance scanner to, with a repetition time, irradiate the subject with RF excitation pulses, emitted from said RF resonator arrangement, each having a flip angle, and, between said RF excitation pulses, in a single readout window without a magnetic field gradient, to readout a single FID-like SSFP signal, and before said readout window to activate at least one phase coding gradient, emitted by said gradient coil system, to phase code said subject in at least one spatial direction and, before a next RF excitation pulse, to activate at least one further phase coding gradient, emitted by said gradient coil system, to cancel said phase coding in said at least one spatial direction.

116. (New) A magnetic resonance spectroscopy apparatus comprising:

a radio frequency resonator arrangement and a gradient coil system;

a control unit for operating said magnetic resonance scanner to, with a repetition time, irradiate the subject with RF excitation pulses, emitted from said RF resonator arrangement, each having a flip angle, and, between said RF excitation pulses, in a single readout window without a magnetic field gradient, to readout a single echo-like SSFP signal, and before said readout window to activate at least one phase coding gradient, emitted by said gradient coil system, to phase code said subject in at least one spatial direction and, before a next RF excitation pulse, to activate at least one further phase coding gradient, emitted by said gradient coil system, to cancel said phase coding in said at least one spatial direction.

117. (New) A magnetic resonance spectroscopy apparatus comprising:

- a radio frequency resonator arrangement and a gradient coil system;
- a control unit for operating said magnetic resonance scanner to, with a repetition time, irradiate said subject with RF excitation pulses, emitted from said RF resonator arrangement, each having a flip angle, and, between said RF excitation pulses, in a first readout window, to activate at least one readout gradient, emitted from said gradient coil system, alternating in one spatial direction, to readout an FID-like SSFP signal S1 and, in a second readout window separate from said first readout window, to activate at least one readout gradient alternating in one spatial direction, to readout an echo-like SSFP signal.

118. (New) A magnetic resonance spectroscopy apparatus comprising:

- a radio frequency resonator arrangement and a gradient coil system;
- a control unit for operating said magnetic resonance scanner to, with a repetition time, irradiate said subject with RF excitation pulses, emitted from said RF resonator arrangement, each having a flip angle and, between said RF excitation pulses, in a single readout window, to activate at least one readout gradient alternating in one spatial direction, to readout a single FID-like signal.

119. (New) A magnetic resonance spectroscopy apparatus comprising:

- a radio frequency resonator arrangement and a gradient coil system;
- a control unit for operating said magnetic resonance scanner to, with a repetition time, irradiate said subject with RF excitation pulses, emitted from said RF resonator arrangement, each having a flip

angle and, between said RF excitation pulses, in a single readout window, to activate at least one readout gradient alternating in one spatial direction, to readout a single echo-like signal.